Alg. 2 Warm Up # 8-1 Solve by the indicated method:

1) Zero Product Property

$$4x^3 + 14x^2 - 60x = 0$$

2) Completing the Square

$$x^2 - 5x = 1$$

3) Quadratic Formula

$$4x^2 - 3 = 6x$$

HW Questions:

Preview

7-77. Your scientific or graphing calculator can function in both degrees and radians. See if you can determine how to put your calculator in radian mode and then how to switch it back to degree mode. On most scientific calculators, a small "DEG" or "RAD" shows on the screen to let you know in which mode you are working.

a. With your calculator in degree mode, find $\sin 60°$ and record your answer. Then switch to radian mode and find $\sin\frac{\pi}{3}$. Did you get the same answer? Explain why your answers should be the same or different.

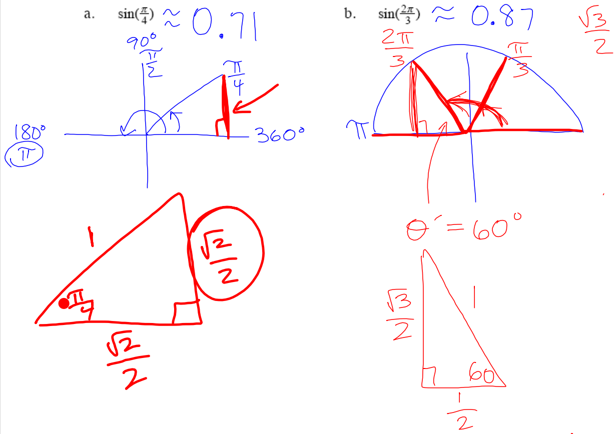
b. Find $\sin\frac{\pi}{4}$. Which angles, measured in degrees, would have the same sine as $\sin\frac{\pi}{4}$?

$45° + 360n$ let $n =$ integer
$135° + 360n$

7-78. Calculate each of the following values. Express your answers both exactly and as decimal approximations.

a. $\sin(\frac{\pi}{4}) \approx 0.71$

b. $\sin(\frac{2\pi}{3}) \approx 0.87$ $\frac{\sqrt{3}}{2}$



7-79. Show how the Zero Product Property can be used to solve each of the following equations.

1.3

a. $x(2x-1)(x-3)=0$

$-2x$
$3x$
$+x$

b. $2x^3+x^2-3x=0$

$x(2x^2+x-3)=0$

$x(2x+3)(x-1)=0$

7-80. Solve each of the following equations.

a. $5^x = 72$ b. $2^{3x} = 7$ c. $3^{(2x+4)} = 17$

7-81. Greg was working on his homework. He completed the square to change $y = 2x^2 - 6x + 2$ to graphing form and identify the vertex of the parabola. He did the work at right and identified the vertex to be $(\frac{3}{2}, -\frac{1}{4})$. When he got back to class and checked his answers, he discovered that his vertex was wrong, but he cannot find his mistake. Examine Greg's work and explain to him where the mistake occurred. Then show him how to correct the mistake and state the vertex.

$y = 2x^2 - 6x + 2$

$y = 2(x^2 - 3x) + 2$

$y = 2(x^2 - 3x + \frac{9}{4}) + 2 \cancel{- \frac{9}{4}}$ $-\frac{9}{2}$

$y = 2(x - \frac{3}{2})^2 - \frac{1}{4}$

7-82. Change each of the following equations to graphing form and then, without graphing, identify the vertex and axis of symmetry for each.

a. $y = 3x^2 - 18x + 26$ b. $y = 3x^2 - 4x - 11$

$\left(-\frac{4}{3}\right)\frac{1}{2} = -\frac{2}{3}$

$\left(-\frac{2}{3}\right)^2 = \frac{4}{9}$

$\frac{3}{1} \cdot \frac{4}{9} = \frac{4}{3}$

$y = 3(x^2 - \frac{4}{3}x + \frac{4}{9}) - 11 - \frac{4}{3}$

$y = 3(x - \frac{2}{3})^2 - \frac{33}{3} - \frac{4}{3}$

$y = 3(x - \frac{2}{3})^2 - \frac{37}{3}$

$V: (\frac{2}{3}, -\frac{37}{3})$

7-83. Solve each of the following equations for x.

a. $171 = 3(5^x)$

b. $171y = 3(x^5)$

$$\frac{171y}{3} = \frac{3(x^5)}{3}$$

$$\sqrt[5]{57y} = \sqrt[5]{x^5}$$

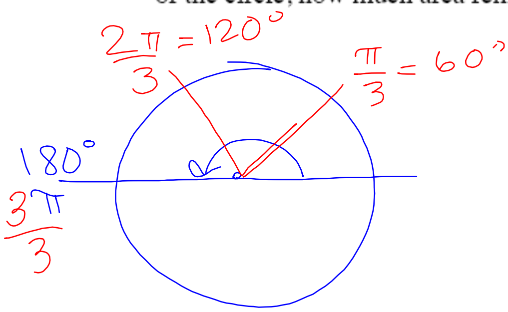
$$x = \sqrt[5]{57y}$$

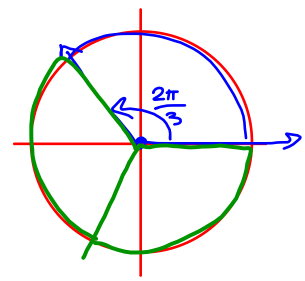
7-84. Sketch a graph of $x^2 + y^2 = 100$.

a. Is it a function?

b. What are its domain and range?

c. Draw a central angle that measures $\frac{2\pi}{3}$ radians. If you remove this wedge of the circle, how much area remains?





7-85. Find the equation for the inverse of the function $f(x) = 2\sqrt{\frac{(x-3)}{4}} + 1$. Sketch the graph of both the original and the inverse.

simplify!

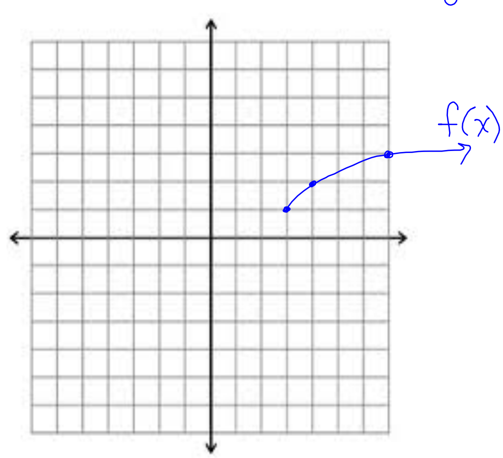
$$f(x) = \cancel{2}\frac{\sqrt{x-3}}{\cancel{2}} + 1$$

$$f(x) = \sqrt{x-3} + 1$$

locator pt $(3,1)$

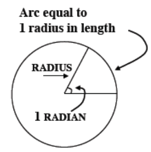
Now find inverse:

$$x = \sqrt{y-3} + 1$$



Friday's CP's:

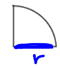
7-72. HOW TO MAKE A RADIAN



Imagine wrapping the radius of a circle around the circle. The angle formed at the center of the circle that corresponds to the arc that is one radius long has a measure of exactly one **radian**.

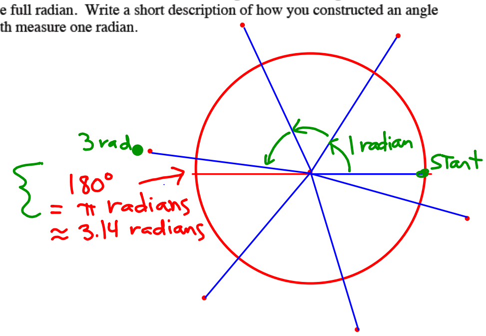
Your teacher will provide each member of your team with a different-sized circular object and some scissors.

a. Trace your circular object onto a sheet of paper and carefully cut out the circle. Fold the paper circle in half and then in half again so that it is in the shape of a quarter circle, as in the diagram at right. How can you see the radius of your circular object in this new folded shape?



b. Place your circular object onto another sheet of paper and trace it again, only this time leave the circular object in place. Roll (or wrap) a straight edge of your folded circle around your circular object and mark one radius length on the traced circle. Then mark another radius length that begins where the first one ended. Continue marking radius lengths until you have gone around the entire circle.

c. Remove the circular object from your paper. On your traced circle, connect each radius mark to the center, creating central angles. Each angle you see, formed by an arc with a length of one radius, measures one **radian**. Label each of the radius lengths and each angle that measures one full radian. Write a short description of how you constructed an angle with measure one radian.



7-73. Assume the radius of a circle is one unit. $C = 2\pi r$

a. What is the area of the circle? What is its circumference? $C = 2\pi(1)$

b. How many radii would it take to wrap completely around the circle? Express your answer as a decimal approximation *and* as an exact value. $\rightarrow 2\pi$
≈ 6.28

c. Does the size of the circle matter? That is, does the number of radii it takes to wrap around the circle change as the radius of the circle gets larger or smaller? Why does this make sense?

d. Exactly how many radians are in 360°? In 90°? $\rightarrow \frac{\pi}{2}$

2π

$\boxed{7\text{-}76}$ Convert from degrees to radians

$5(30^o) = \frac{\pi}{6} \cdot 5$

$120^o = \frac{2\pi}{3}$

$3(45^o) = \frac{\pi}{4} \cdot 3$

$135^o = \frac{3\pi}{4}$

$60^o = \frac{\pi}{3}$

$150^o = \frac{5\pi}{6}$

$90^o = \frac{\pi}{2}$

$180^o = \pi$ radians

$\boxed{7\text{-}76}$ Convert from degrees to radians

$30^o = \frac{\pi}{6} \approx 0.52$

$120^o = \frac{2\pi}{3}$

$45^o = \frac{\pi}{4} \approx 0.79$

135^o

$60^o = \frac{\pi}{3} \approx 1.05$

150^o

$90^o = \frac{\pi}{2} \approx$

$180^o = \pi$

Convert degrees ⟷ radians

$$\frac{2\cancel{\pi}\ \cancel{\text{radians}}}{9}\left(\frac{180^\circ}{\cancel{\pi}\ \cancel{\text{rad.}}}\right) = \frac{2(\overset{20}{\cancel{180}})^\circ}{\cancel{9}}$$

(1)

$$= 40^\circ$$

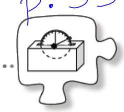
$$315^{\cancel{\circ}} \cdot \frac{\pi \text{ rad.}}{180^{\cancel{\circ}}} = \frac{315}{180}\pi \text{ rad.}$$

$$= \frac{7\pi}{4}$$

CP's: 7- #86 ---> 89

p. 337

7.1.6 What do I know about a unit circle?



Building a Unit Circle

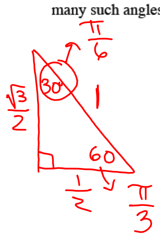
In this lesson, you will further develop your understanding of the unit circle and how useful it can be. By the end of the lesson, you should be able to answer the questions below.

What can the unit circle help me understand about an angle?

What does my information about angles in the first quadrant tell me about angles in other quadrants?

SOH CAH TOA

7-86. There are some angles for which you know the *exact values* of sine and cosine. In other words, you can find the exact sine and cosine without using a calculator. Work with your team to find as many such angles (expressed in radians) as you can.

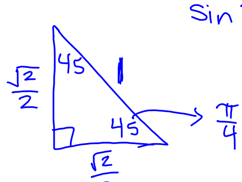


$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$ $\cos\frac{\pi}{3} = \frac{1}{2}$

$\sin\frac{\pi}{6} = \frac{1}{2}$ $\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$\sin\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

$\cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

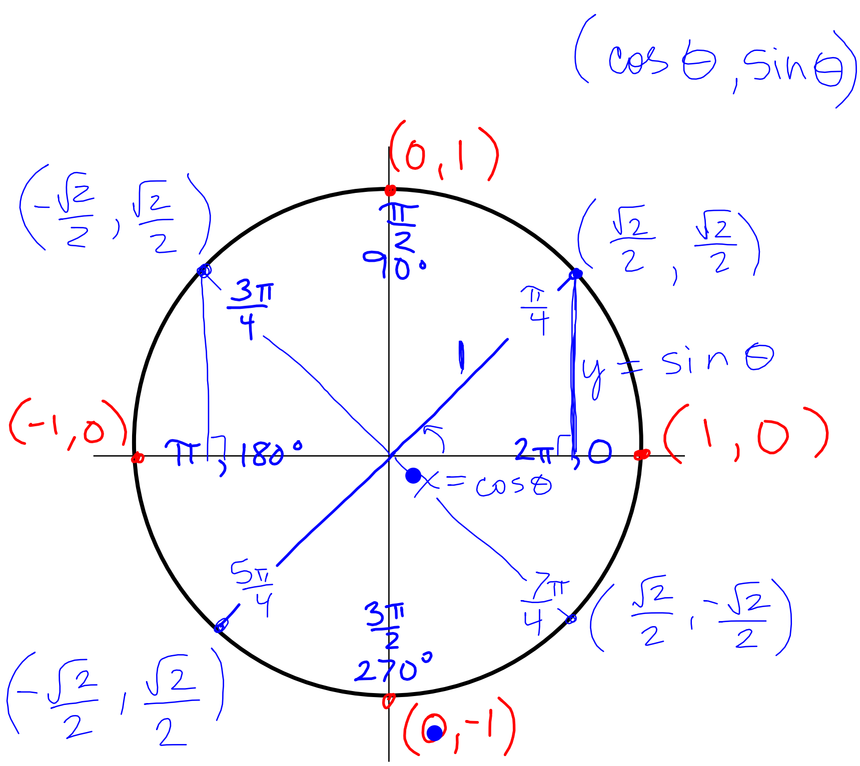


7-87. Now you will build a unit circle. Obtain the Lesson 7.1.6 Resource Page from your teacher. There are points shown at $\frac{\pi}{12}$, $\frac{\pi}{6}$, $\frac{\pi}{4}$, $\frac{\pi}{3}$, $\frac{5\pi}{12}$, $\frac{7\pi}{12}$, $\frac{2\pi}{3}$, $\frac{3\pi}{4}$, $\frac{5\pi}{6}$, and $\frac{11\pi}{12}$ units along the circle, starting from the positive x-axis.

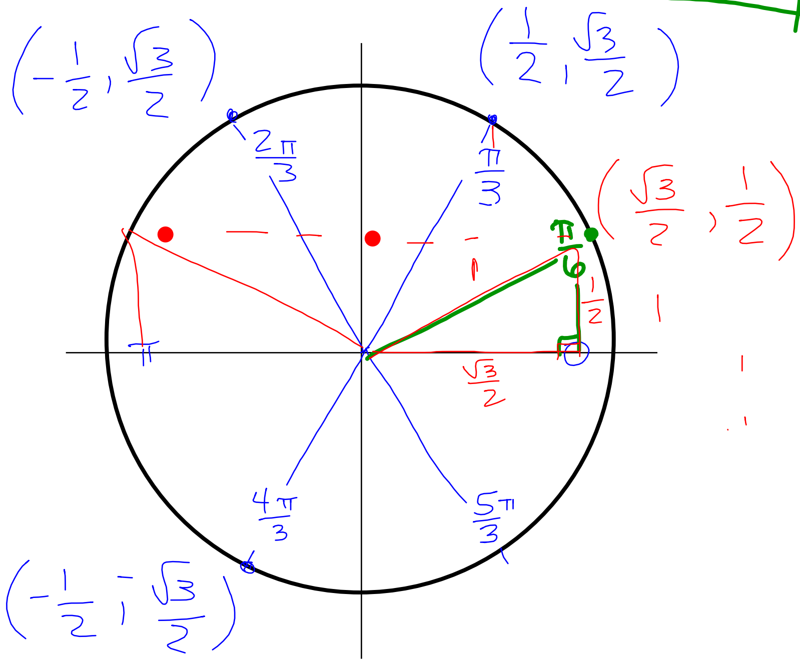
a. Find and label the exact coordinates, in (x, y) form, for three of the points shown in the *first quadrant*.

b. Mark *all* other points in the unit circle for which you can find *exact* coordinates. Not all of them are shown. Label each of these points with its angle of rotation (in radians) and its coordinates.

c. If you have not done so already, label each angle with its corresponding radian measure.



$(\cos\theta, \sin\theta)$



7-88. Draw a new unit circle, label a point that corresponds to a rotation of $\frac{\pi}{12}$, and put your calculator in radian mode.

a. What are the coordinates of this point, correct to two decimal places?

b. Use the information you found in part (a) to determine each of the following values: (Hint: Drawing each angle on the unit circle will be very helpful.)

i. $\sin(-\frac{\pi}{12})$ *ii.* $\cos\frac{13\pi}{12}$ *iii.* Challenge: $\cos\frac{7\pi}{12}$

7-89. For angle α in the first quadrant, $\cos\alpha = \frac{8}{17}$. Use that information to find each of the following values without using a calculator. Be prepared to share your strategies with the class.

a. $\sin\alpha$ b. $\sin(\pi + \alpha)$ c. $\cos(2\pi - \alpha)$

HW: 7-

#90 ---> 98